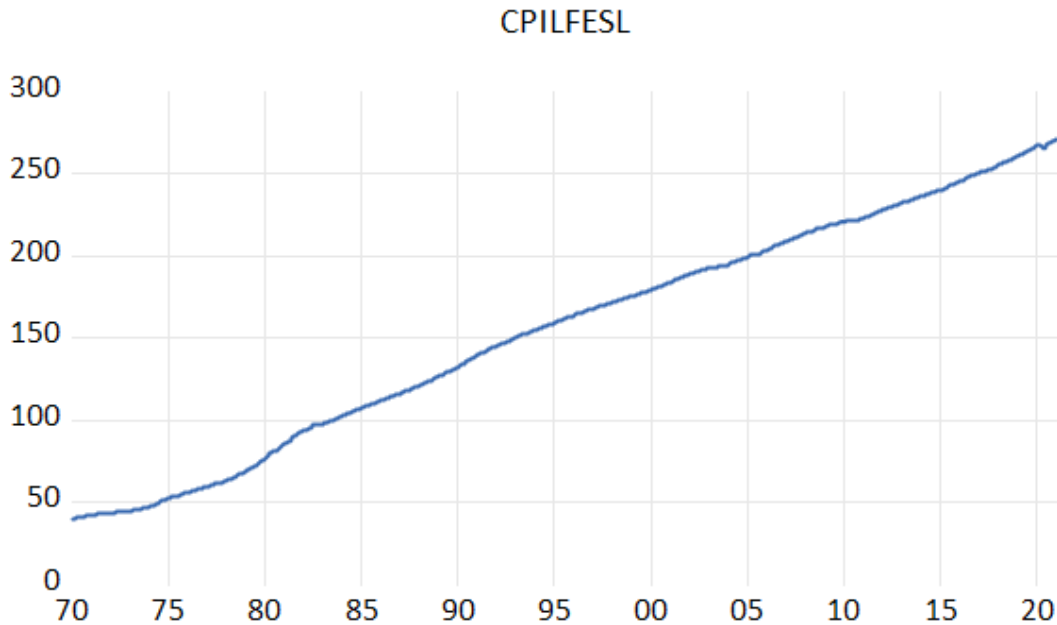
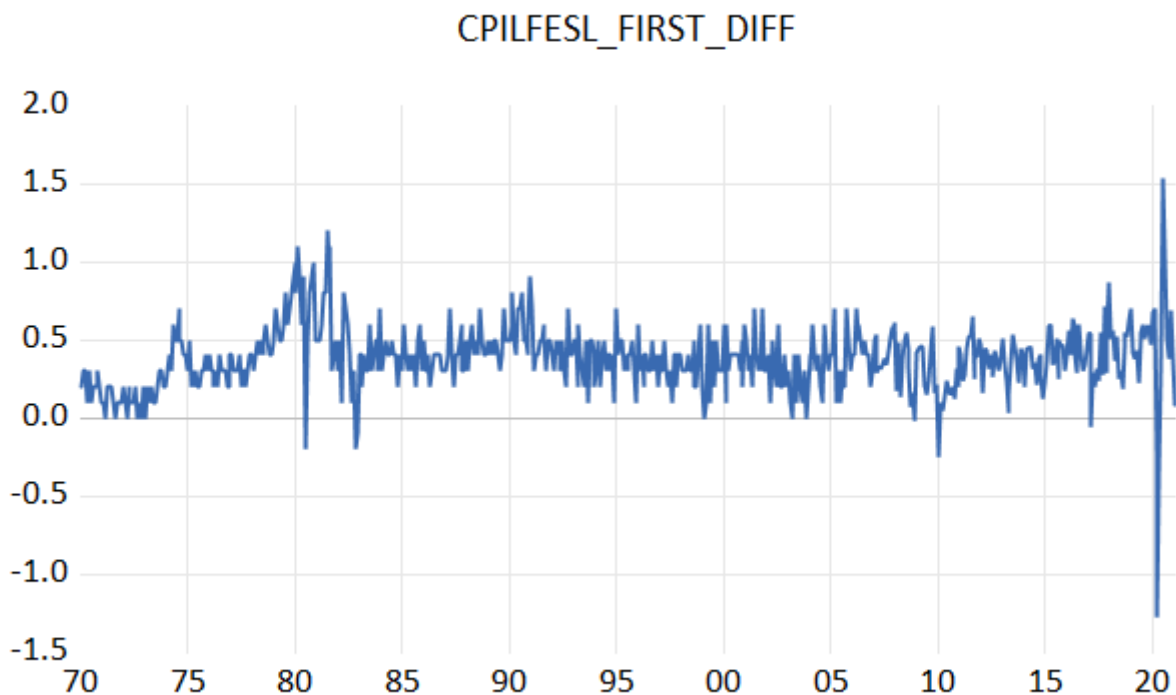


Assignment 1 – Paolo Sebastiani

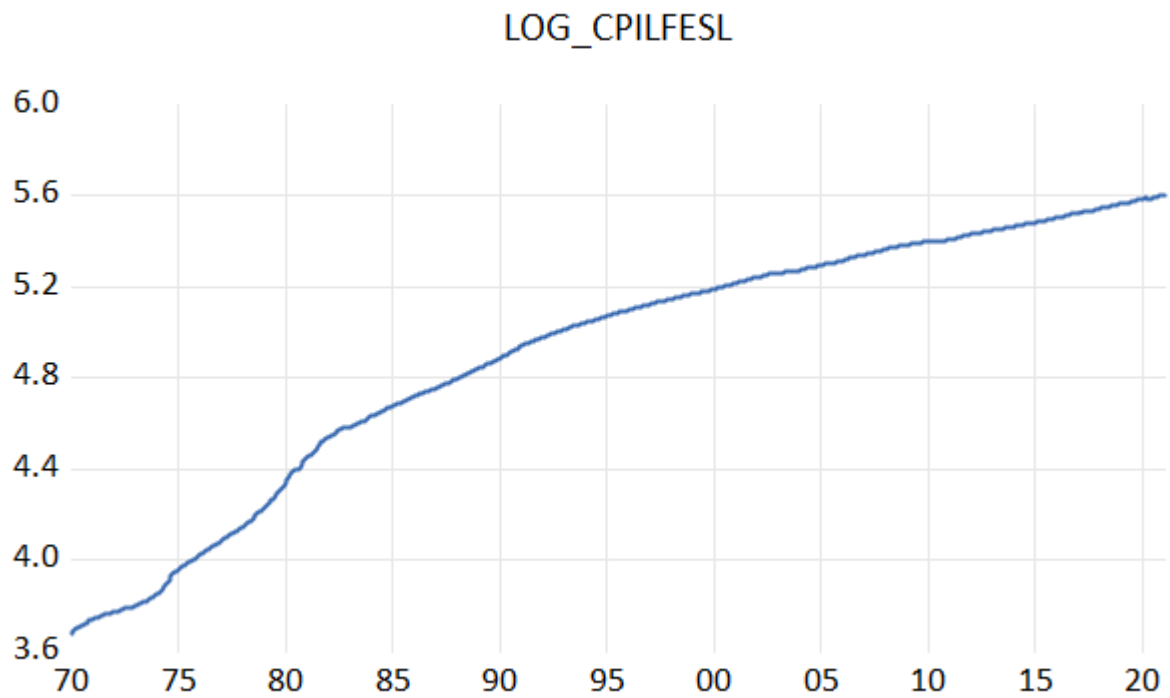
1° Variable: CPILFESL (*Consumer Price Index for All Urban Consumers: All Items Less Food and Energy. Index 1982-1984 = 100*)



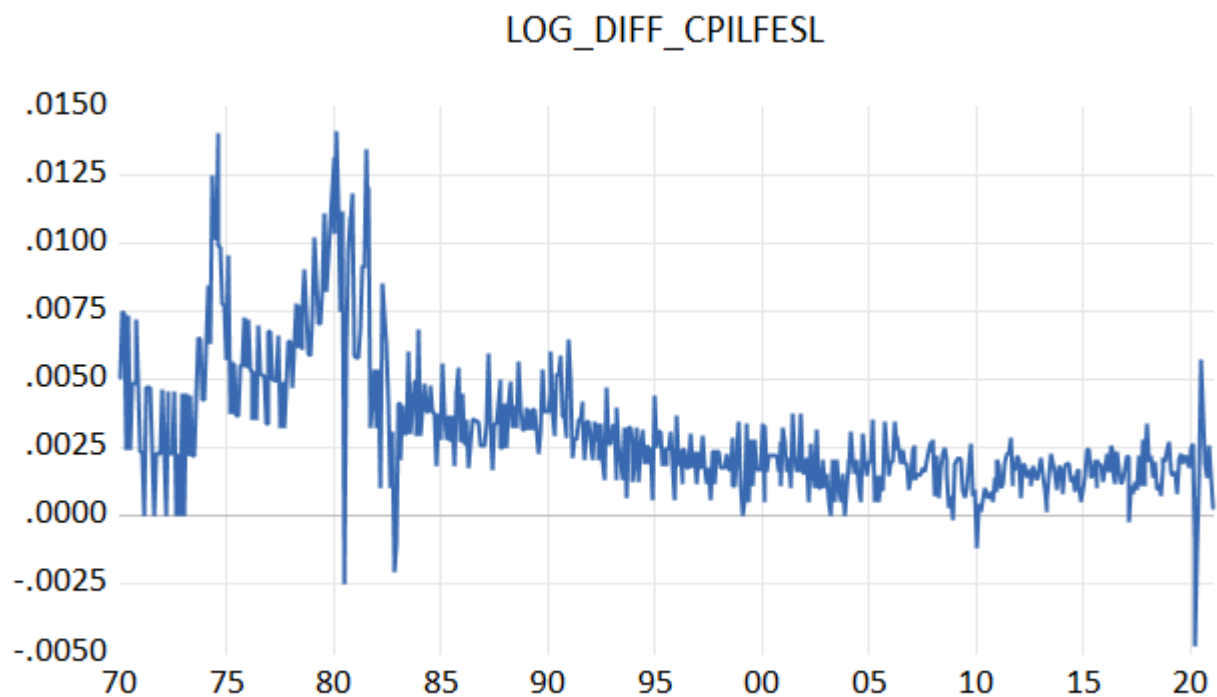
This series (in levels) is clearly non-stationary, as it presents a rather linear upward trend.



By taking the first differences, the upward trend is removed. Now the series looks much more stationary, with a quite constant mean (close to zero) and variance (except for the huge drop in 2020 due to Covid crisis).

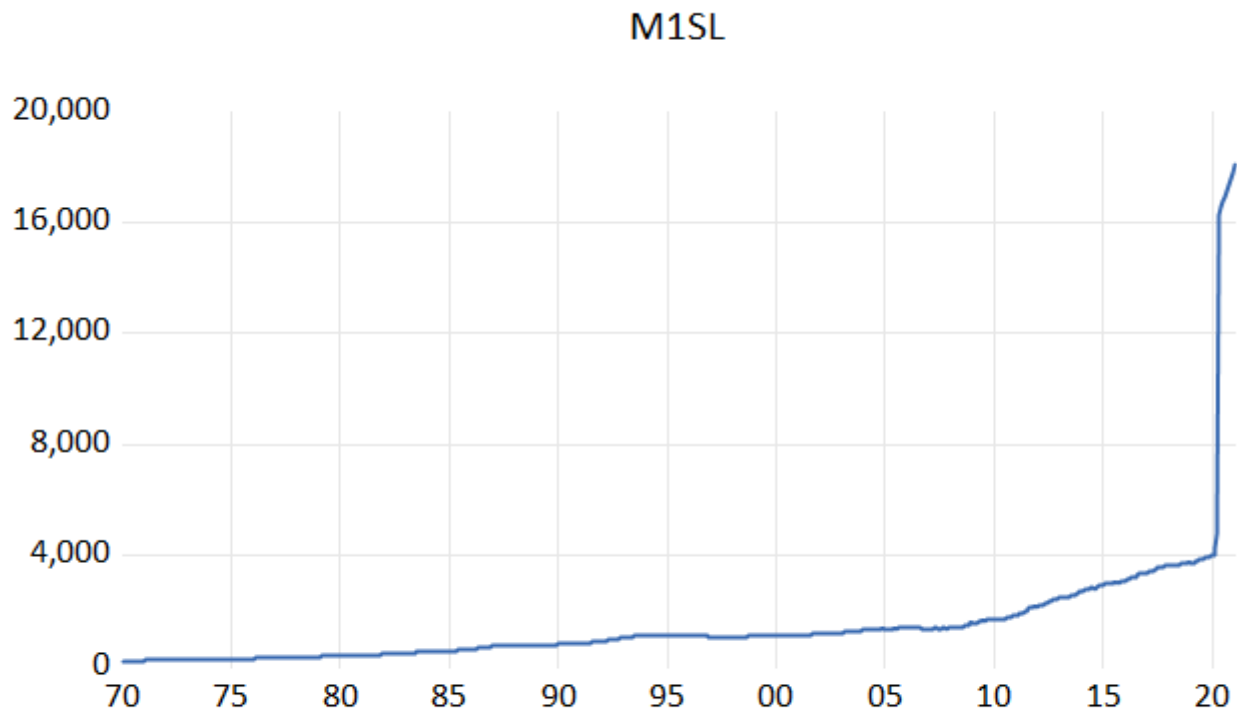


Taking logs does not make the series stationary, as an upward trend is clearly still present. However, it might have helped in reducing the variance (for instance, now the drop in 2020 is not as spiky as before).

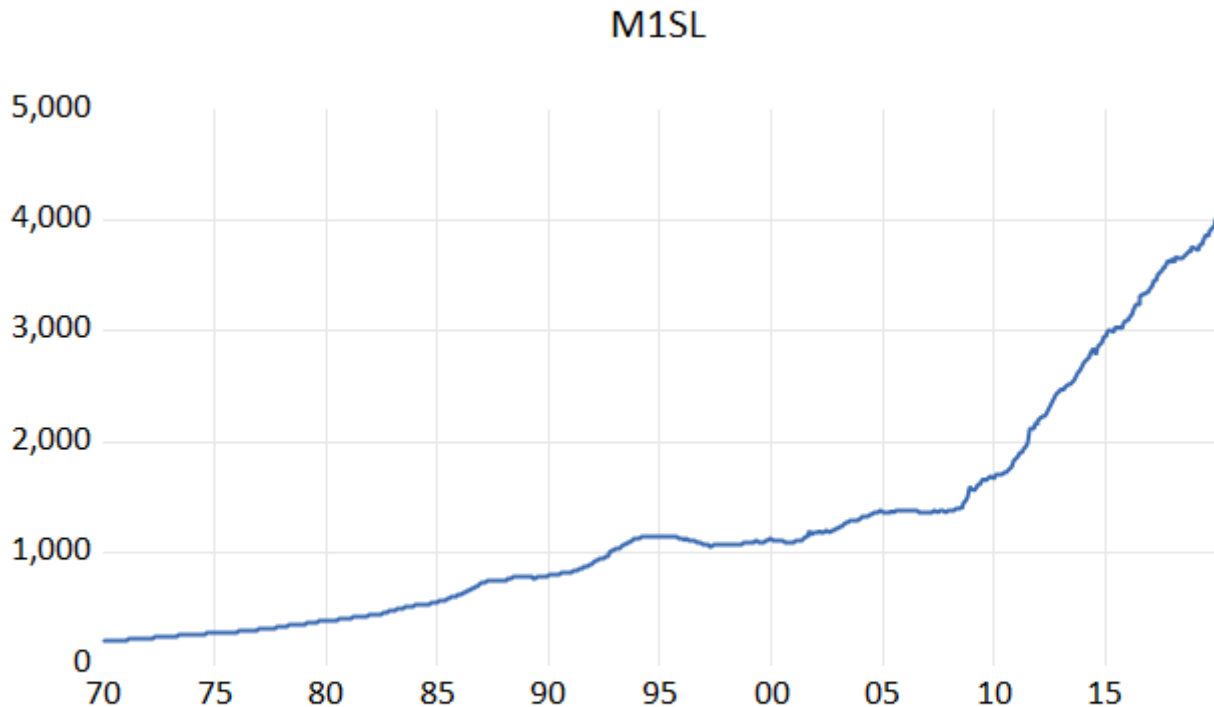


With the first differences of logs, the upward trend is removed. However, the series is probably still non-stationary, as the mean seems to present a slightly decreasing trend, and the variance in the first part (1970-1985) is significantly different from the variance in the remaining part of the series.

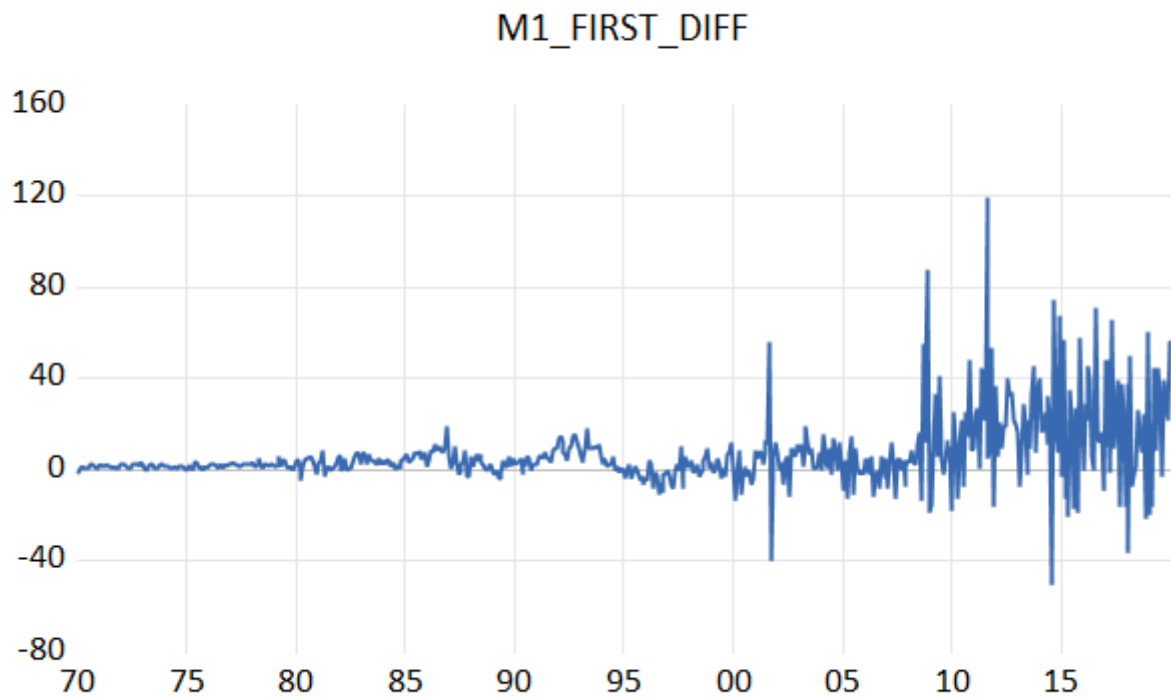
2° Variable: *M1* (FED definition, in billions of dollars)



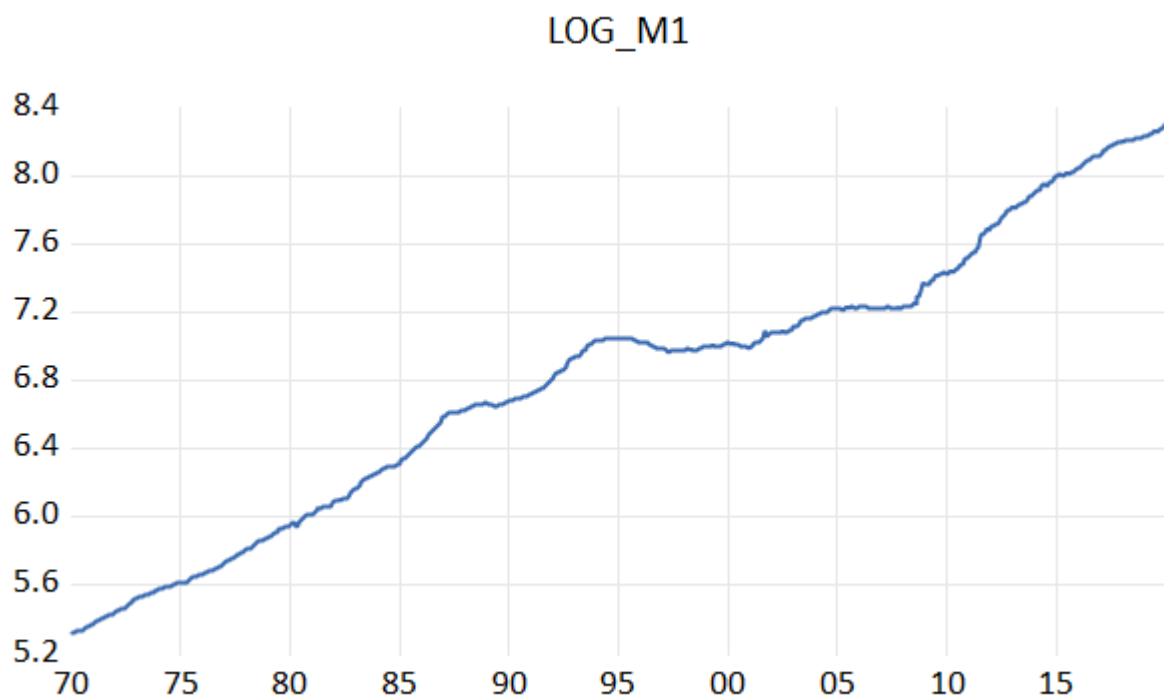
All the series is clearly distorted by the huge increase in May 2020, that was probably caused both by a change in the definition of M1 (the FED has started to include also saving deposits, which were the main component of M2 before May 2020) and by the ultra-expansive monetary policy in response to the Covid crisis.



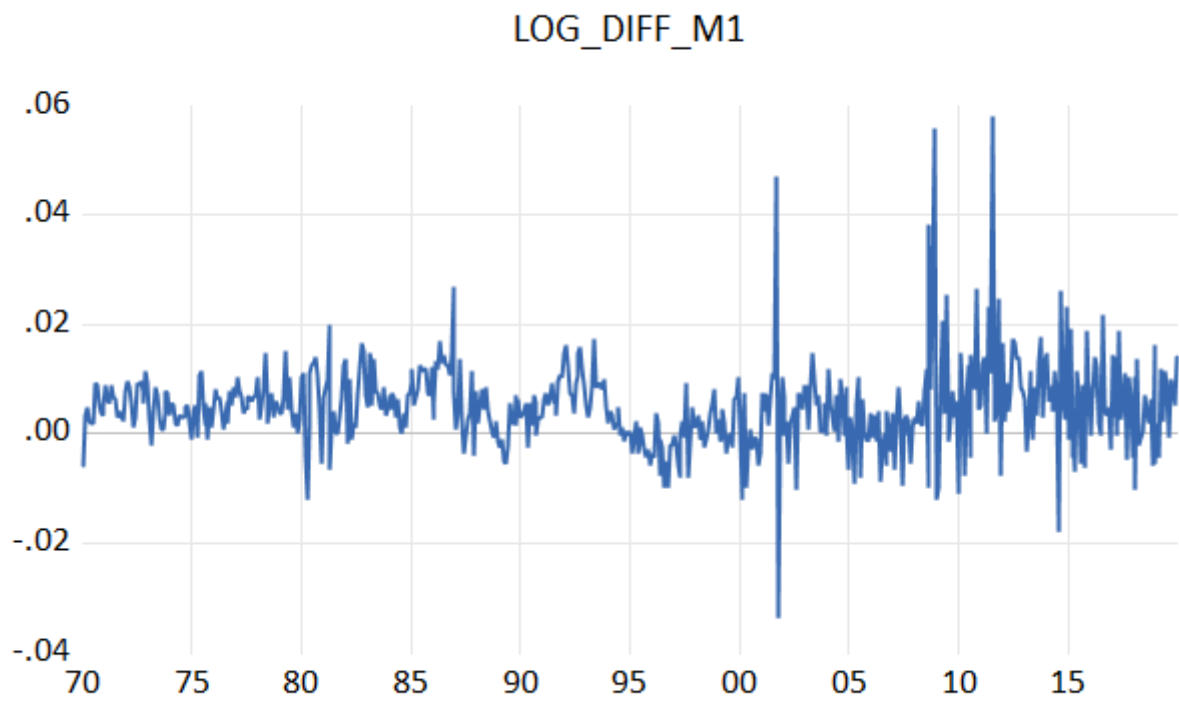
Therefore, I've decided to analyze the series only until 2019 to overcome that outlier. It presents a non-linear upward trend, so it's definitely non-stationary.



By taking the first differences of the series, the upward trend is removed. However, it's hard to determine whether the mean is constant or not, because there is a huge variance in the final part. It's possible to state for sure that the whole series is non-stationary in variance.



By taking the logs of levels, the upward trend is still present (but now it's much more linear), so the series remains non-stationary.



Finally, by taking first differences of logs, the series looks quite stationary in mean, while for the variance it seems to be still non-stationary.